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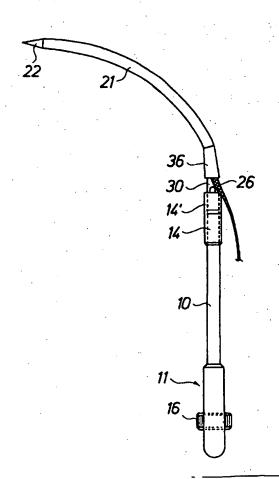
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(54) Title: SURGICAL INSTRUMENT FOR TREATING FEMALE URINARY INCONTINENCE

(57) Abstract

A surgical instrument for treating female urinary incontinence comprises a shank (10) having a handle (11) at one end thereof, and two curved needle-like elements (21A, 21B) which can be connected one at the time with the shank at the other end thereof to form a curved end portion of the shank and are attached at one end thereof each with one end of a netting (26) which is intended to be implanted into the body and is covered by a thin plastic sheath (34).



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Surgical instrument for treating female urinary incontinence

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The invention relates to a surgical instrument for treating female urinary incontinence, of the type described in PCT/SE95/00964 the content of which is incorporated herein by reference, comprising a shank having a handle at one end thereof, and two curved needle-like elements which are each attached at one end thereof to one end of a tape to be implanted into the body, and are constructed to be connected one at the time with the shank to form a curved portion at the other end thereof each element being intended to be passed into the body via the anterior (suburethral) vaginal wall and being dimensioned to extend from the inside surface of the vaginal wall over the back of the pubic bone to the outside of the abdominal wall.

The object of the invention is to further improve the surgical instrument disclosed in said document and for this purpose the instrument of the invention has obtained the characterizing features of claim 1.

The invention will be explained in more detail with reference to the accompanying drawings which disclose the surgical instrument according to the invention and wherein.

FIG. 1 is a side view of the surgical instrument according to the invention,

FIG. 2 is a plan view of the surgical instrument, FIG. 3 is an exploded side view of one of the needles and tape and shrinkage hose to be connected with said needle,

FIG. 4 is a side view of the needle in FIG. 3 with the tape connected therewith,

FIG. 5 is an enlarged fragmentary axial cross sectional view of a coupling of the instrument for connecting an exchangeable needle thereof, and

FIG 6 is a side view of two needles and a tape interconnecting said needles.

In the following description the same reference numerals have been used as in PCT/SE85/00964 for corresponding details of the instrument.

The surgical instrument comprises a cylindrical tubular shank 10 having at one end thereof a handle 11. At the other end of the shank there is a socket 14. A cylindrical shaft 15 is rotatably mounted in the shank and can be rotated manually by means of a knob 16 mounted to one end of the shaft. The other end of the shaft forms a cylindrical portion 17, FIG 5, of smaller outside diameter than the shaft, which joins a portion 18 having external threads, a smooth end portion 19 of further reduced diameter joining the threaded portion 18, end portion 19 forming a guide pin at said other end of the shaft. Portions 18 and 19 are received in the portion of socket 14 projecting from the shank. The surgical instrument as described so far is in agreement with the instrument disclosed in PCT/SE95/00964 except that the end portion 14' of socket 14 is flattened from opposite sides (cfr FIGS 1 and 2), so that the cross section of said end portion is noncircular.

The surgical instrument also includes an exchangeable and disposable needle 21 which at one end thereof is attached to the shank at one end of the needle and extends over substantially a quarter of a circle to the other, free end thereof in order to follow substantially the profile of the pubis between the vagina and the abdominal wall. The needle has uniform circular cross section and has a smooth, preferably polished outside surface. At the free end thereof the needle forms a point 22 by being terminated by a conical portion.

For attachment of needle 21 to shank 10 the needle forms at said one end thereof a straight portion 30 which

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is cylindrical but has milled flat faces 31 over that part of said portion 30, extending from the adjacent end of the needle, which shall be received by socket portion 14'. The needle should be oriented in a predetermined rotational position in relation to the shank, and more particularly it should project at right angles to the plane of handle 11. This rotational position is secured by the non-circular shape of socket portion 14' and the end portion of the needle having the flat faces 31, which fits into socket portion 14'. The end portion of the needle having the flat faces 31 joins the body of the needle over e conical portion 32, which tapers towards a shoulder 33.

An axial blind hole extends from the end surface of the needle said hole having a threaded portion 23 and inwardly thereof a narrower, cylindrical portion 24. Guide pin 19 is dimensioned to be guidingly received by said latter portion when the threaded portion 18 for attaching needle 21 to the rest of the surgical instrument is screwed into threaded portion 23 of the blind hole by rotating shaft 15 by manual rotation of knob 16, the end surfaces of the shank and the needle being pressed against each other. Also this attachment is in agreement with that described in PCT/SE95/00964.

When the method as described in PCT/SE95/00964 is practised two needles 21A and 21B, FIG. 6 of the embodiment described shall be connected one at each end of a tape 26. According to the present invention the tape of the preferred embodiment comprises a mesh or netting forming openings of the order of 1 mm. A suitable material for the tape is PROLENE®, a knitted polypropylene mesh having a thickness of 0,7 mm manufactured by Ethicon, Inc., Sommerville, New Jersey, USA. This material is approved by FDA in USA for implantation into the human body. The netting (tape) preferably has a width of approximately 10 mm and is enclosed in a thin polyethylene sheath 34 which in

flattened condition has substantially the same width as the tape although a difference in width is shown in FIG 2 in order to make the provision of the sheath more clear. The length of the netting should be approximately 400 mm. The netting and the sheath are interconnected by means of two rows 35 of stiching. The end portion of the sheath is attached to the conical portion 32 of the needle by means of a suitable strong glue, and the interconnection of the needle and sheath is covered by a shrink hose 36 of rubber which extends from the shoulder 33 over the conical portion 32 and partly over the cylindrical end portion 30 of the needle. The shrink hose is substantially flush with the surface of the needle at the shoulder. By this arrangement the netting is securely attached to the needle.

The purpose of sheath 34 is above all to facilitate the insertion of the netting in the manner described in PCT/SE95/00964 i e when the netting is pulled at the ends thereof from the vaginal wall to the abdominal skin and to avoid that rough edges of the netting irritate or damage the body tissues.

When the tape has been positioned in the correct position as a sling around the urethra the polyethylene sheath shall be removed, and in order to facilitate the removal the sheath should be perforated at the longitudinal center thereof as indicated by a dot-and-dash line 37 in FIG. 6, so that the two halves of the sheath can be withdrawn from the body by pulling at the respective outer ends thereof the halves being separated at the perforation under the influence of the pulling force.

The purpose of the polyethylene sheath is also to protect the netting during attachment to the needles and during handling before and during insertion into the body.

The longitudinal center of the tape and sheath should be indicated by a visible colour mark 38, FIG. 6 so that the surgeon readily can see when the netting is sym-

metrically located with reference to urethra during the surgery.

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CLAIMS

- 1. Surgical instrument for treating female urinary incontinence, comprising a shank (10) having a handle (11) at one end thereof, and two curved needle-like elements (21) which are each attached at one end thereof to one end of a tape (26) to be implanted into the body, and are constructed to be connected one at the time with the shank to form a curved portion at the other end end thereof each element being intended to be passed into the body via the anterior (suburethral) vaginal wall and being dimensioned to extend from the inside surface of the vaginal wall over the back of the pubic bone to the outside of the abdominal wall, c h a r a c t e r i z e d in that the tape comprises a netting (26) enclosed by a thin plastic sheath (34).
 - 2. Instrument as in claim 1 c h a r a c t e r i z e d in that the netting (26) is made of polypropylene.
 - 3. Instrument as in claim 2 c h a r a c t e r i z e d in that the sheath (34) is made of polyethylene.
- 4. Instrument as in any of claims 1 to 3 c h a r a c t e r i z e d in that the sheath (34) is perforated at the longitudinal center thereof.
 - 5. Instrument as in any of claims 1 to 4 characteristant characterist characterist characteristic (26) and the sheath are interconnected by stitching ((35).
- 25 6. Instrument as in any of claims 1 to 5 c h a r a c t e r i z e d in that the needle-like element (21) comprises a non-circular end portion fitting into a non-circular socket (14') at said other end of the shank (10).
- 7. Instrument as in claim 6
 c h a r a r a c t e r i z e d in that said end portion of the needle-like element (21) joins the rest of the element by a conical portion (32) tapering towards a shoulder (33) on the needle-like element.

- 8. Instrument as in claim 7 c h a r a c t e r i z e d in that the netting (26) and the sheath (34) are connected to the needle-like element (21) by gluing to said conical portion (32).
- 9. Instrument as in claim 8 c h a r a c t e r i z e d in that the netting (26) and the sheath (34) at the site of attachement thereof are covered by a shrink hose (36).
- 10. Instrument as in claim 9 c h a r a c t e r i z
 10 e d in that one end of the shrink hose (36) abuts the
 shoulder (33) and is substantially flush with the surface
 of the needle-like element at said shoulder.
- 11. Instrument as in claim 9 or 11, characterized in that the netting (26) and the sheath (34) project from the shrink hose (36) at the other end thereof.
 - 12. Instrument as in any of claims 1 to 11, c h a r a c t e r i z e d in that a visable marking (38) is provided on the sheath (34) at the longitudinal center thereof.

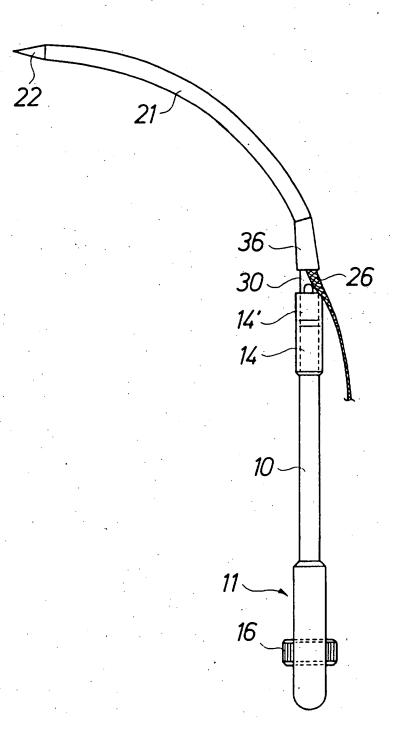


FIG. 1

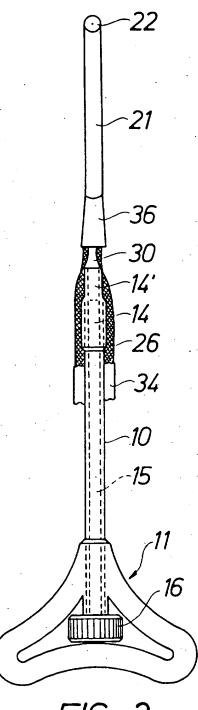
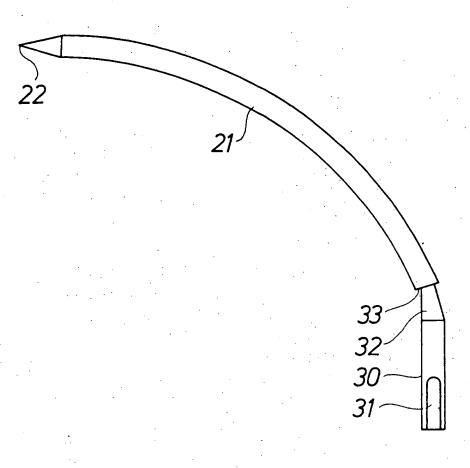
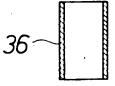


FIG. 2





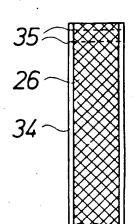
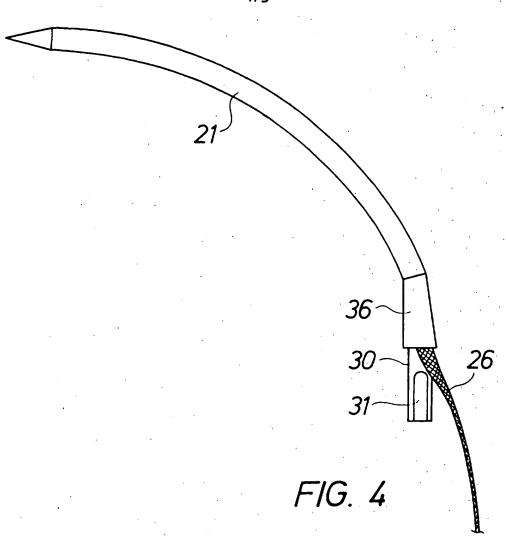


FIG. 3



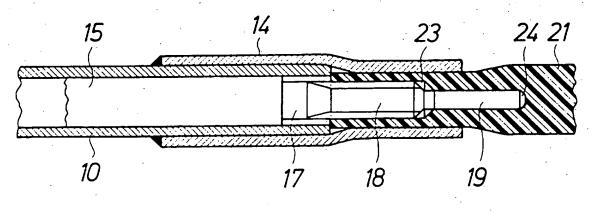
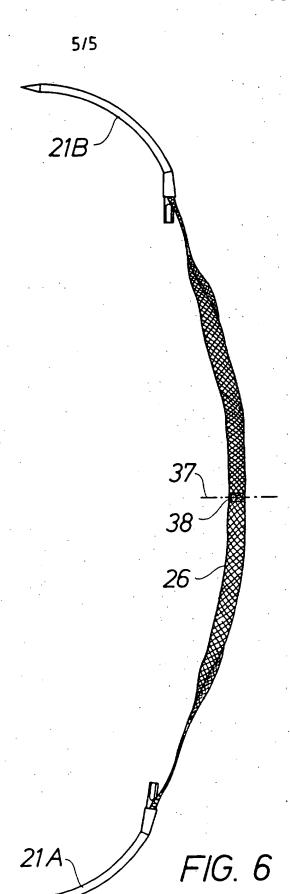


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 96/01269

PCG: A61B 17/04 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPCG: A61B DOG: MAB DOG: A61B DOG: MAB DOCUMENTS CONSIDERED TO BE RELEVANT Calcagory* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. P SE 503271 C2 (MEDSCAND AB), 29 April 1996 (29.04.96) A WO 9003766 A1 (P.E. PETROS), 19 April 1990 (19.04.90) A DE 4334419 A1 (KLINIKUM DER ALBERT-LUDMIGS-UNIVERSITÄT FREIBURG.), 13 April 1995 (13.04.95) A US 5403328 A (SHALLMAN, R.W.), 4 April 1995 Further documents are listed in the continuation of Box C. See patent family aimex. P Second categories of cete documents A' document diching the general state of the art which is not considered to the up particular relevance of the polymorphic date of the relevance of the particular relevance to the date of the art which is not considered to the up particular relevance to the date of the art which is not considered to the up articular relevance to the date of the date of the second of the documents of the polymorphic date of the occument published on particular relevance to in-moist a anisomal he comments that specifies on small sections, use, established in sealing the second of the documents of the processor of the documents of the document of the processor of the document of the relevance of the document of the relevance of the document called the specifies on the relevance of the document of the relevance of the documen										
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ALBERT-LUDWIGS-UNIVERSITAT FREIBURG.), 13 April 1995 (13.04.95) But S 5403328 A (SHALLMAN,R.W.), 4 April 1995 Further documents are listed in the continuation of Box C. Special categories of cited documents: A document defining the general state of the art which is not considered to be of particular relevance of the continuation of the international filing date of the and not in conflict with the application but cited to understand the principle or theory underlying the invention conditions the publication date of another oftation or other special reason has specified) A document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another oftation or other special reason has specified) A document reterring to an oral disclosure, use, exhibition or other mass document published prior to the international search of the priority date claimed invention cannot be considered to involve an inventive step when the document is taken alone of the actual completion of the international search B March 1997 Some and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM A pril 1995 See patent family annex. To later document published after the international filing date of the priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention cannot be considered to involve an inventive an inventive step when the document is taken alone. To document operation of priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention of the principle or theory underlying		 .								
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Special categories of cited documents: A document defining the general state of the art which is not considered to be of particular relevance. E criter document but published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) O document referring to an oral disciosure, use, exhibition or other means P document published prior to the international filing date but later than the priority date claimed O attenued to establish the publication disciosure, use, exhibition or other means Date of the actual completion of the international search Date of the actual completion of the international search Seedish Patent Office O Adocument Office O Adocument of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is taken alone when the document is taken alone of considered to involve an inventive step when the document is to involve an inventive step when the document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is taken alone when the document is taken alone of the original particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is taken alone or original particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is taken alone. Y document relevance: the claimed invention or other step when the document is a document of particular relevance: the claimed invention or original particular relevance:			•							
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L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another ortation or other special reason (as specified) document reterring to an oral disclosure, use, exhibition or other means P" document published prior to the international filing date but later than the priority date claimed Date of the actual completion of the international search March 1997 Same and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Anette Hall	"A" document defining the general state of the art which is not considered date and not in conflict with the application but cited to understand									
document reterring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed. Date of the actual completion of the international search. March 1997 Same and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Anette Hall	"L" document cited to e	nt which may throw doubts on priority claim(s) or which is establish the publication date of another citation or other	considered novel or cannot be considered to involve an inventive							
the priority date claimed **E** document member of the same patent family Date of the actual completion of the international search **Date of mailing of the international search **Date of mailing of the international search report **Date of mailing of the int	Special ro 'O" documen means	cason (as specified) it referring to an oral disciosure, use, exhibition or other	considered to involve an inventive step when the document is combined with one or more other such documents, such combination							
Date of the actual completion of the international search Date of mailing of the international search report 06.03.97 Same and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Date of mailing of the international search report Authorized officer Anette Hall	bearing parameter prior to the international ining date nut later than									
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INTERNATIONAL SEARCH REPORT Information on patent family members

03/02/97

International application No.

PCT/SE 96/01269

Patent document cited in search report		Publication date	Patent family member(s)		Publication date	
SE-C2-	503271	29/04/96	AU-A- SE-A- WO-A-	3402495 9402872 9606567	22/03/96 01/03/96 07/03/96	
WO-A1-	9003766	19/04/90	AT-T- AU-A- DE-D,T- EP-A,B- SE-T3- US-A-	119758 4406489 68921762 0437481 0437481 5112344	15/04/95 01/05/90 03/08/95 24/07/91 12/05/92	
DE-A1-	4334419	13/04/95	NONE			
US-A-	5403328	04/04/95	CA-A- EP-A-	2094685 0567130	23/10/93 27/10/93	